



# **The Millennium Cohort Study**

**Armed Forces Epidemiological Board  
Anti-Malarials Subcommittee and Expert Panel**

**12 April 2004**

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for  
CDR Margaret Ryan, MC, USN  
and the Millennium Cohort Study Team**



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Operational team in San Diego includes many professionals:  
Gia Gumbs, MPH (coordinator), Suzanne Clark, Thomas Corbeil,

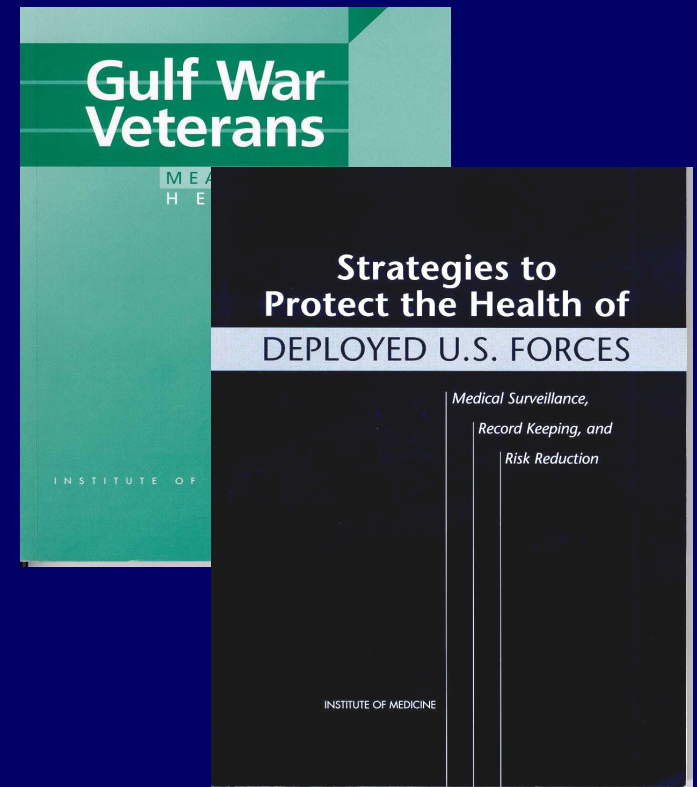
Lesley Henry, Susan Hume, Sheila Jackson, Nick Martin, Robert Reed, MS, Besa Smith, MPH, Tyler Smith, MA, Steven Speigle, Timothy Wells, DVM, PhD, James Whitmer, and Sylvia Young, MD, MPH.

# The Millennium Cohort Study

- ◆ Section 743 of the 1999 Strom Thurmond Act authorized the US Secretary of Defense to establish a... *longitudinal study* to evaluate data on the health conditions of members of the Armed Forces...

## Institute of Medicine Reports

- ◆ Recommended a prospective cohort study of service members.
- ◆ Encouraged capitalization on new surveillance and health data, not available at the time of the Gulf War.
- ◆ In the model of Framingham and other cohorts, measure deployment impact prospectively.



# The Millennium Cohort Study



- ◆ Primary objective  
Assess adjusted risk for development of common chronic diseases of concern (including asthma, diabetes, hypertension, heart disease), as well as chronic multi-symptom illnesses within the cohort.
- ◆ Secondary objectives  
Assess functional health status, over time, within the cohort.

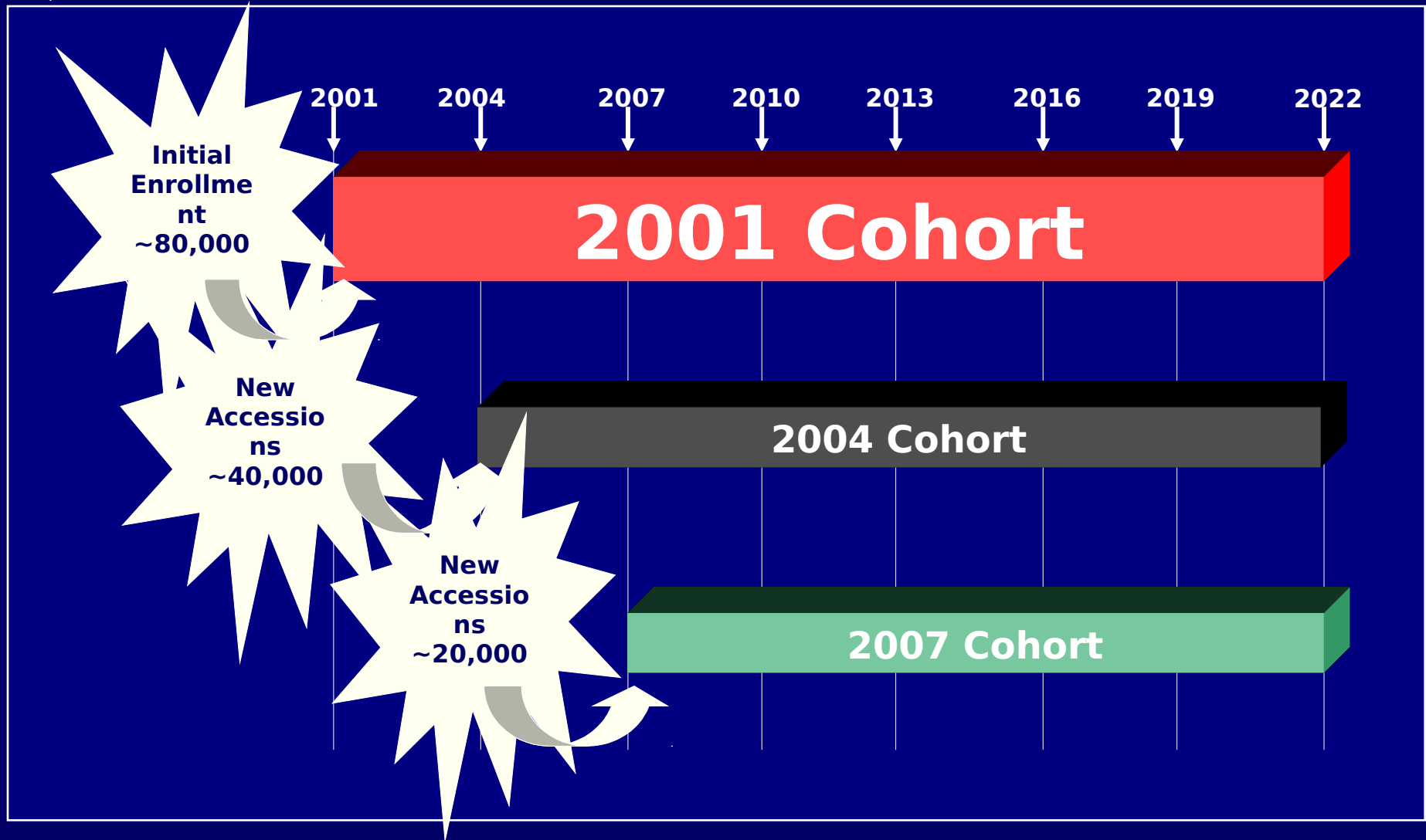
# The Millennium Cohort Study



## Methods

- ◆ Enroll a large, stratified random sample of US military personnel on duty as of October 2000.
- ◆ Survey at 3-year intervals through 2022.
- ◆ In 2004 and 2007, add new accession cohorts.
- ◆ Link to other data to assess long-term effects of military exposures.

# The Millennium Cohort Study



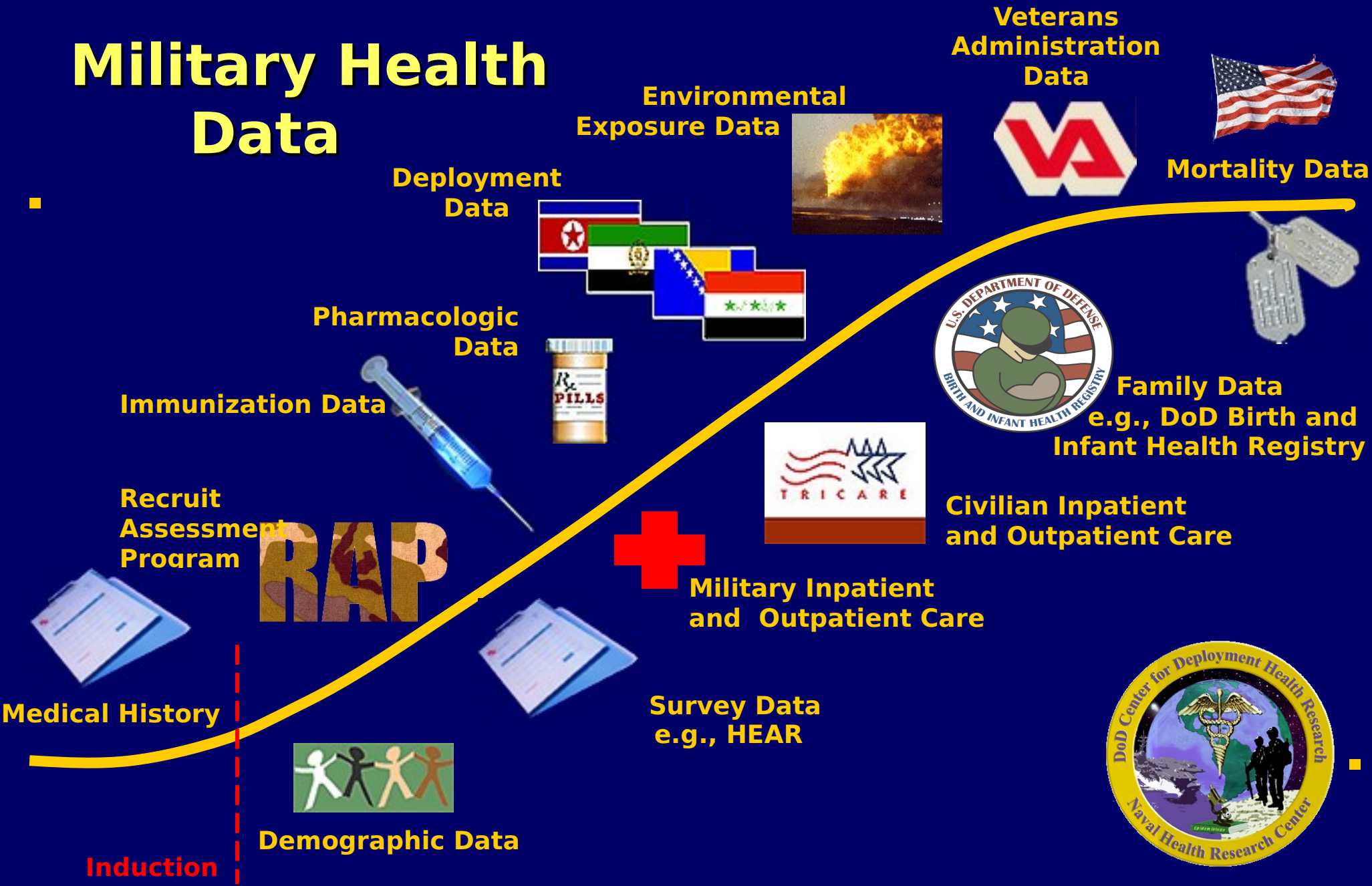
# The Millennium Cohort Study



Some data sets to be linked to core survey data:

- ♦ Demographic and deployment data
- ♦ Immunizations
- ♦ Outpatient care
- ♦ Medications (pharmacy data)
- ♦ Hospitalizations
- ♦ Birth Registry data
- ♦ Veterans disability data
- ♦ Mortality data

# Military Health Data



# The Millennium Cohort Study

## Enrollment Methodology

- ◆ Using standard instruments, focus groups and pilot testing honed survey.
- ◆ Simple, mark-sense form was created using advanced software.
- ◆ Modified Dillman methods, augmented with email invitations, are used to enroll.
- ◆ Addresses are sought from multiple sources.

**SEABEE HEALTH STUDY QUESTIONNAIRE**

WE NEED YOUR HELP. This questionnaire will help us study the health of current and former Naval Construction Battalion personnel. This information is for research purposes only and confidentiality of all information is protected by public law. Please feel free to reference any records you may have in your possession. Would you like a copy of the study results? Yes ☐ No ☐

**Privacy Act Statement**  
(1) Authority: 5 USC 301, 10 USC 1071, and E.O. 9397. (2) Purpose: To improve the identification, resolution, or prevention of illnesses, and to assist in the formulation of policies for the Departments of Defense and Veterans Affairs. It is hoped that subjects who complete the survey will participate in follow-on study activities concerning health. (3) Routine Uses: None. (4) Disclosure: Voluntary. No penalty will accrue to an individual for not furnishing the requested information.

**SEABEES**

**\* USE NO. 2 PENCIL ONLY.**  
• Do NOT use ink, ballpoint, or felt tip pens.  
• Erase cleanly and completely any changes you make.  
• Make black marks that fill the circle.  
• Do NOT make any stray marks on the form.

**When applicable:**  
• Write the numbers in the boxes at the top of the block.  
• Fill in the corresponding circles below.

**For office use only**

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[www.millenniumcohort.org](http://www.millenniumcohort.org)



## Website provides information and option for online enrollment.

- ◆ Advanced security and backup features.
- ◆ Automatic confirmation emails sent
- ◆ “Update address” and other pages facilitate communication.



# The Millennium Cohort Study



Prime-MD disorders and syndromes evaluated:

- ◆ Somatoform disorder (question 13)
- ◆ Depressive syndromes (question 14)
- ◆ Panic Syndrome (questions 15 & 16)
- ◆ Other Anxiety Syndrome (question 17)
- ◆ Alcohol Abuse (question 49)

# The Millennium Cohort Study



Short-Form 36 Health Survey scales evaluated:

- ◆ General Health (questions 26 & 35)
- ◆ Physical Functioning (question 27)
- ◆ Role-Physical (question 28)
- ◆ Role-Emotional (question 29)
- ◆ Social Functioning (questions 30 & 34)
- ◆ Bodily Pain (questions 31 & 32)
- ◆ Vitality (question 33)
- ◆ Mental Health (question 33)

# The Millennium Cohort Study



Deployment / War / Casualty: *Have you ever been exposed to any of the following?*  
(question 58)

- ◆ Witnessing a death due to war, disaster, or tragic event
- ◆ Witnessing instances of physical abuse
- ◆ Dead and/or decomposing bodies
- ◆ Maimed soldiers/civilians
- ◆ Prisoners of war/refugees
- ◆ Chemical or biological warfare agents
- ◆ Other medical countermeasures for chemical or biological...
- ◆ Alarms necessitating wear of protective gear

# The Millennium Cohort Study



Chemical / Biological: *During the past 3 years, were you personally exposed to any of the following? (question 59)*

- ◆ Occupational hazards requiring personal protective equipment
- ◆ Routine skin contact with paints, solvents, substances
- ◆ Depleted uranium
- ◆ Microwaves
- ◆ Pesticides, including creams, sprays, uniform treatments
- ◆ Pesticides applied to the environment / living facilities
- ◆ Any exposure physical or psychological, during a military deployment that significantly impacted your health

# The Millennium Cohort Study



60. Over the past 3 years, did you receive imminent danger pay, hardship duty pay, or combat zone tax exclusion benefits for deployment to any of the regions listed below?

- ☐ No → Skip to question 63  
☐ Yes → Continue to question 61

## Country Codes

01 Afghanistan  
02 Bahrain  
03 Croatia  
04 Kuwait or Iraq  
05 Kyrgyzstan  
06 Macedonia  
07 Montenegro  
08 Oman  
09 Pakistan

10 Philippines  
11 Qatar  
12 Saudi Arabia  
13 Serbia (includes Kosovo)  
14 Tajikistan  
15 Turkey  
16 United Arab Emirates  
17 Uzbekistan  
18 Other country

## Sea Codes

19 Arabian Sea  
20 Gulf of Aden  
21 Gulf of Oman  
22 Persian Gulf  
23 Red Sea  
24 Other sea area

please specify

please specify

# The Millennium Cohort Study



## Current status

- ◆ Enrollment initiated in Aug 2001
- ◆ Enrollment year marked by challenges, including Sep 11th terrorist attacks, anthrax in US mail system in Oct 2001, and US deployments to Afghanistan and Iraq.
- ◆ More than 77,000 enrolled to date.
- ◆ Complement to 120,000 expected with enrollment in 2004; of 140,000 by 2007. expect total
- ◆ Internet enrollment >50%.

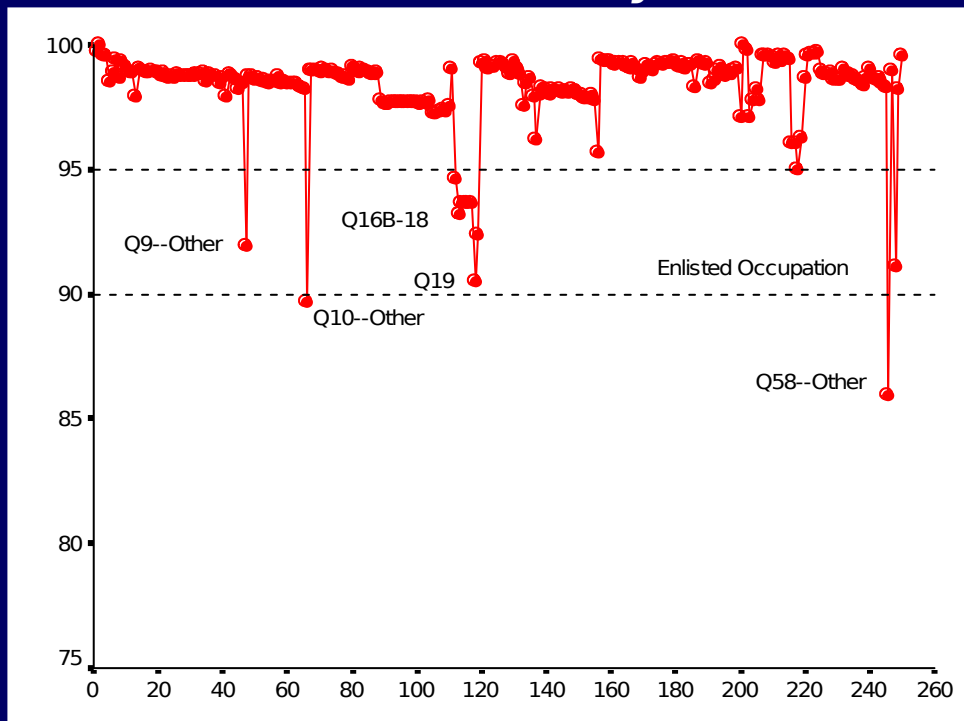
# The Millennium Cohort Study



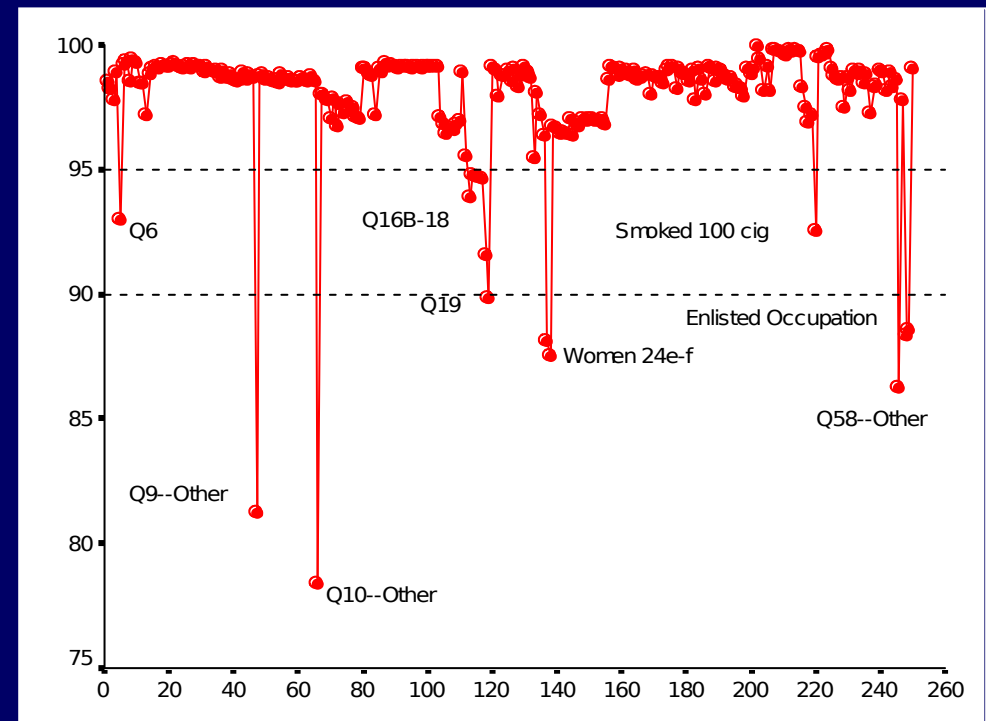
## Intensive Analyses of Data Quality

e.g., question-specific completion rates: internet responders vs. mail responders

**Internet survey**



**Paper Survey**



# Responders versus non-responders and refusers



Responders are more likely to be\*:

- Older (OR=1.32 - 2.67)
- Highly educated (OR=1.10 - 1.73)
- White race/ethnicity (OR=1.63)
- Female (OR=1.49)
- Married (OR=1.35)
- Army (OR=1.30)
- Officers (OR=1.20)
- Reservists (OR=1.10)
- Past deployers (OR=1.07)
- Working in the fields of communications and intelligence, health care, other technical, and functional support.

*\* Results of preliminary multivariable logistic regression analyses.*

Conclusion: Minimal response bias based on demographics, all accounted for in statistical modeling.



## **Responders** versus non-responders and refusers

Pilot Study (n=2500) data were linked to military databases to quantify healthcare utilization in the 12 months prior to invitation into the study. (Wellness and obstetric care were excluded)

- ♦ Responders averaged 3.3 days of healthcare use (inpatient and outpatient)
- ♦ Non-responders averaged 2.9 days of healthcare use.

Difference not statistically significant in multivariable modeling.

Conclusion: No or minimal apparent response bias based on prior health.



**Internet responders** are more likely to be\*:

- Active duty (versus Reservists) (OR=1.50, CI 1.44-1.56)
- Male (OR=1.42, CI 1.36-1.49)
- Race/ethnicity other than black (OR=1.23, CI 1.16-1.32)
- Married (OR=1.19, CI 1.14-1.25)
- Air Force (OR=1.13, CI 1.07-1.19)
- Ages 25-35
- High school grads or have some college  
(versus no degree or advanced degree)
- Working in the fields of electronics,  
communications and intelligence, functional support,  
or other technical specialty.

*\*Results of  
preliminary  
multivariable logistic  
regression analyses.*

Conclusion: Minimal response bias based on preference or access to use of the internet.



## **Planned analyses and collaborations to date:**

### Planned and approved:

- ◆ An Evaluation of Early Response Bias in the Cohort
- ◆ Self-Reported Mental Health Among US Military Personnel, Prior and Subsequent to the Terrorist Attacks of September 11, 2001
- ◆ Mental Health Characteristics Among Cohort Members

### Future opportunities:

- ◆ Self-reported Health Changes After Deployments to US Operation Enduring Freedom and Operation Iraqi Freedom (*in development*)
- ◆ Collaboration interest also expressed by US Centers for Disease Control and Prevention and several universities.
  - ◆ Collaborative guidelines have been developed by co-investigators

# The Millennium Cohort Study

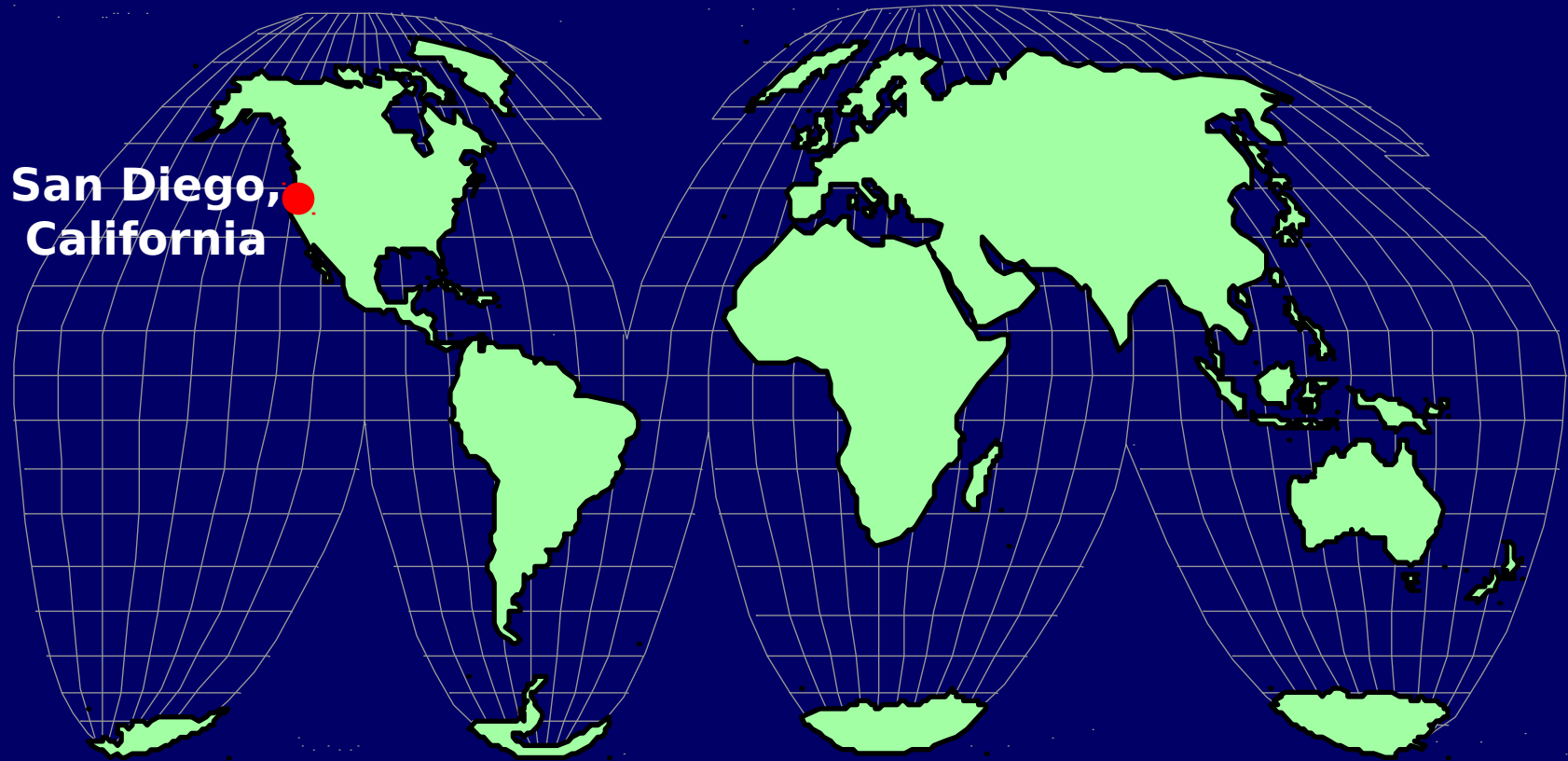


## Oversight

- ◆ Co-investigators represent all US military services and Veterans Affairs (Drs Amoroso, Boyko, Gackstetter, Gray, Hooper, Riddle, Ryan)
- ◆ Protocols designed with external consultation
- ◆ Multiple Human Use Review Boards
- ◆ External scientific review by  
Sciences
- ◆ Annual review by the US Armed  
Forces Epidemiological Board
- ◆ Millennium Cohort Scientific Committee



# DoD Center for Deployment Health Research



<http://www.nhrc.navy.mil/rsch/code25/program5.htm>

<http://www.millenniumcohort.org>